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airGRdatasets: Hydro-Meteorological Catchments Datasets for the 'airGR' Packages. Manual of the R package version 0.2.1

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Package ‘airGRdatasets’

July 13, 2023

Type Package

Title Hydro-Meteorological Catchments Datasets for the 'airGR'
Packages

Version 0.2.1

Date 2023-07-11

Description Sample of hydro-meteorological datasets extracted from the 'CAMELS-FR' French database <<https://hal.inrae.fr/hal-03687235>>. It provides metadata and catchment-scale aggregated hydro-meteorological time series on a pool of French catchments for use by the 'airGR' packages.

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Encoding UTF-8

Depends R (>= 3.5.0)

Suggests testthat

URL <https://gitlab.irstea.fr/HYCAR-Hydro/airrgalaxy/airgrdatasets>

BugReports <https://gitlab.irstea.fr/HYCAR-Hydro/airrgalaxy/airgrdatasets/-/issues>

NeedsCompilation no

LazyData true

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airGRdatasets-package *Hydro-Meteorological Catchments Datasets for the 'airGR' Packages*

Description

Sample of hydro-meteorological datasets extracted from the 'CAMELS-FR' French database <<https://hal.inrae.fr/hal-03687235>>. It provides metadata and catchment-scale aggregated hydro-meteorological time series on a pool of French catchments for use by the 'airGR' packages. More especially, it can be used by teachers and students for hydrological modeling exercises adapted to the 'airGRteaching' package as described in Delaigue et al. (submitted) and in the 'airGRteaching' vignettes.

The package contains the following types of datasets:

- **lumped_daily**: a set of lumped catchment daily hydrometeorological time series, and associated metadata.

Source

Delaigue, O., Brigode, P., Andréassian, V., Perrin, C., Etchevers, P., Soubeyroux, J.-M., Janet, B. and Addor, N. (2022). CAMELS-FR: A large sample hydroclimatic dataset for France to explore hydrological diversity and support model benchmarking. 11th edition of the IAHS Scientific Assembly. International Association of Hydrological Sciences, Montpellier, 29 May - 3 Jun. 2022. [hal-03687235](https://hal.inrae.fr/hal-03687235)

References

Delaigue, O., Brigode, P., Thirel, G. and Coron, L. (submitted). airGRteaching: an open-source tool for teaching hydrological modelling. Hydrology and Earth System Sciences.

lumped_daily *Metadata and daily time series of catchment-scale hydro-meteorological observations*

Description

The meteorological forcing is derived from the SAFRAN reanalysis (8 km resolution grid) produced by Météo-France (Vidal et al., 2010).

The meteorological forcing is aggregated at the catchment scale and merged to streamflow data in the CAMELS-FR database from INRAE (Delaigue et al., 2022). To do that, boundaries, area and elevation are calculated using the SRTM DEM (Werner, 2001); the stations were snapped on a theoretical river network by INRAE (100 m resolution grid).

The streamflows, codes and name of hydrometric station are provided by the SCHAPI (the French Central Hydrometeorological and Flood Forecasting Support Service) on the Hydroportail website (SCHAPI, 2022). Streamflows are converted into mm/d using the DEM-based area.

Usage

A273011002
A605102001
B222001001
E540031001
E645651001
H010002001
H120101001
F439000101
H622101001
J171171001
J421191001
K134181001
K265401001
K731261001
V123521001
X031001001
X045401001
Y643401001
Y862000101

Format

[list] of 3 elements:

Meta [list] metadata

- Code [list] of 2 [character] codes of the hydrometric station (H3: code since 2022, H2: former code)
- Name [character] name of the hydrometric station (H3)
- Coor [list] of 2 [numeric] coordinates (X and Y) of the catchment outlet [decimal degrees; epsg: 4326]
- Area [numeric] area of the catchment [km²]

TS [data.frame] catchment daily time series from 1999-01-01 to 2018-12-31

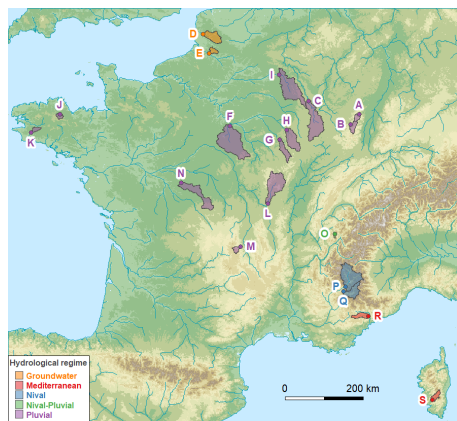
- Date [POSIXct] dates (timezone = "UTC")
- Ptot [numeric] total precipitation (liquid + solid) [mm/d]
- Temp [numeric] mean air temperature [°C]
- Evap [numeric] total potential evapotranspiration computed with Oudin's Formula (Oudin et al., 2005)
- Q1s [numeric] outlet streamflow [l/s]
- Qmmd [numeric] outlet streamflow [mm/d]

Hypso [numeric] hypsometric values (101 quantiles from 0 to 100 % of the elevation range of the catchment) [m]

Note

List of available catchments:

station_code	id_map	station_name
A273011002	A	the Bruche at Russ [Wisches]
A605102001	B	the Meurthe at Saint-Dié-des-Vosges
B222001001	C	the Meuse at Saint-Mihiel
E540031001	D	the Canche at Brimeux
E645651001	E	the Nièvre at Étoile
F439000101	F	the Loing at Épisy
H010002001	G	the Seine at Plaines-Saint-Lange
H120101001	H	the Aube at Bar-sur-Aube
H622101001	I	the Aisne at Givry
J171171001	J	the Trieux at Saint-Péver - Pont Locminé
J421191001	K	the Odet at Ergué-Gabéric - Treodet
K134181001	L	the Arroux at Rigny-sur-Arroux
K265401001	M	the Couze Pavin at Saint-Floret
K731261001	N	the Indre at Saint-Cyran-du-Jambot
V123521001	O	the Ire at Doussard
X031001001	P	the Durance at Embrun [La Clapière] - DREAL PACA
X045401001	Q	the Ubaye at Lauzet-Ubaye [Roche-Rousse] - DREAL PACA
Y643401001	R	the Esteron at Broc [La Clave]
Y862000101	S	the Taravo at Zigliara [Pont d'Abra]

**Source**

Delaigne, O., Brigode, P., Andréassian, V., Perrin, C., Etchevers, P., Soubeyroux, J.M., Janet, B. and Addor, N. (2022). CAMELS-FR: A large sample hydroclimatic dataset for France to explore hydrological diversity and support model benchmarking. 11th edition of the IAHS Scientific Assembly. International Association of Hydrological Sciences, Montpellier, 29 May - 3 Jun. 2022. [hal-03687235](https://hal.archives-ouvertes.fr/hal-03687235)

References

Oudin, L., Hervieu, F., Michel, C., Perrin, C., Andréassian, V., Anctil, F. and Loumagne, C. (2005). Which potential evapotranspiration input for a lumped rainfall-runoff model? Part 2 - Towards a simple and efficient potential evapotranspiration model for rainfall-runoff modelling. *Journal of Hydrology*, 303(1-4), 290-306, doi:10.1016/j.jhydrol.2004.08.026.

SCHAPI (2022). Hydroportail website. Retrieve hydrometric data from the French National Surface Water Quantity Database. <https://www.hydro.eaufrance.fr/>.

Vidal, J.-P., Martin, E., Franchistéguy, L., Baillon, M. and Soubeyroux, J. (2010). A 50-year high-resolution atmospheric reanalysis over France with the Safran system. *International Journal of Climatology*, 30, 1627–1644, doi:10.1002/joc.2003.

Jarvis A., Reuter H.I., Nelson A. & Guevara E. (2008). Hole-filled SRTM for the globe V4. International Centre for Tropical Agriculture (CIAT).

Examples

```
library(airGRdatasets)

# list the datasets in the 'airGRdatasets' package
list_ds <- try(data(package = "airGRdatasets"), silent = TRUE)
list_ds$results[, "Item"]

# load the 'A273011002' catchment data
data(A273011002)

# display the structure of the data
str(A273011002)
```

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